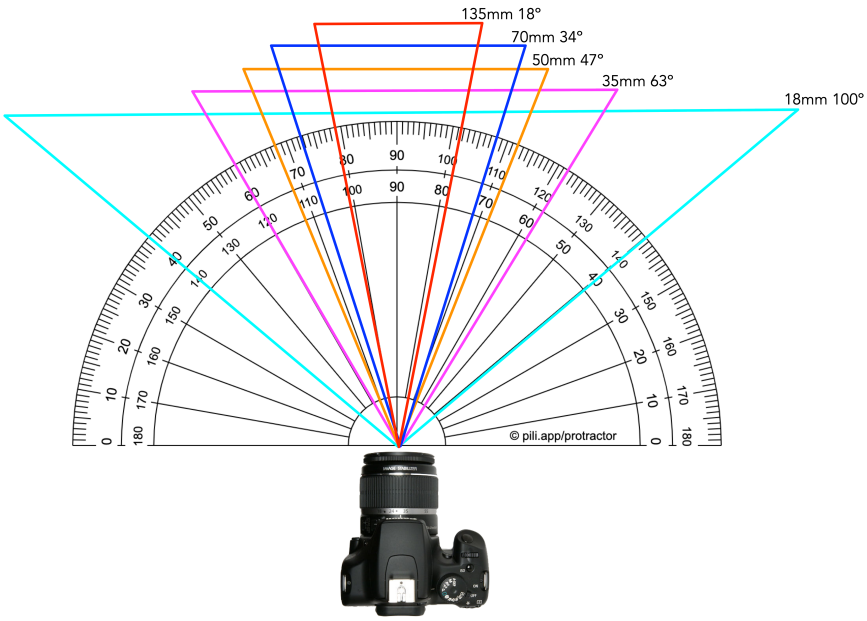
Types of Camera

The two main classes of camera in general use are the Interchangeable Lens Camera (ILC), such as the Digital Single Lens Reflex (DSLR) and the Compact System Camera, (CSC) and the Fixed Lens Camera (FLC), such as the Bridge Camera and the Compact Point and Shoot Camera.
ILC's, as the name suggests, have removable lenses which can be changed while FLC's have a built in lens which cannot be changed.

You can buy an Interchangeable Lens Camera with or without a lens. When you by a camera with a lens included in the package they usually have a lower specification. These are called kit lenses and this is often the cheapest option. If you only buy the camera body you can choose from a range of lenses which will have better specifications but they usually cost more. Most camera manufacturers offer lenses with different specifications which are optimised for a particular camera body.
You don't have to buy a lens from the same manufacturer as the camera. There are specialised lens manufacturers, like Tamron and Sigma, offering a range of lenses for many camera bodies.
The lens attaches to the body using a special mount, you just have to make sure you buy a third party lens with the correct mount for your camera.

One of the advantages of Interchangeable Lens Cameras is that you can select the best lens for photograph you want to take.

One way lenses are classified is by Focal Length and this is measured in millimetres. This is effectively the magnification capability of the lens. This is turn determines Field of View which is how much of the scene is visible in the viewfinder.



The diagram above shows typical Focal Lengths in millimetres and the corresponding Field of View in degrees. As you increase the focal length you reduce the field of view.

Focal Length

There are two main lens types. Prime Lenses which have a single fixed Focal Length, for example 35mm, 50mm or 120mm and Zoom Lenses which allow the Focal Length to be varied, for example 24-70mm or 70-300mm. A general purpose kit lens is usually 18-55mm. All Bridge Cameras and Point and Shoot cameras have built in Zoom Lenses.

Zoom Lenses are very flexible. You can increase or decrease the Field of View for a shot by zooming in or out, in other words changing the Focal Length, without having to change the lens. They can also save you money as you would have to purchase a wide range of individual Prime Lenses to provide the same flexibility. So for example to get the same flexibility as a 24-70mm Zoom you would have to buy a 24mm, 28mm, 35mm, 50mm and a 70mm Prime. The one drawback is the quality of the image. Zooms tend to produce softer images and there is increased distortion especially at the extreme ends of the Zoom range. Prime lenses produce sharper cleaner images. Whether these Zoom versus Prime issues are a factor will depend on what you're photographing and the purpose of your photograph.
Here is an interesting photography blog from Dan Vojtêch which demonstrates the effect varying zoom levels have on an image.

http://www.danvojtech.cz/blog/2016/07/amazing-how-focal-length-affect-shape-of-the-face/

Common types of lenses.

Lenses are usually characterised as Wide Angle, Medium Range and Telephoto.

Wide Angle

12mm-35mm. Wide-angle lenses are used for landscape photography, architecture photography and photos of the sky or the stars.

Medium Range

35mm-70mm. Standard or medium-range lenses are used for portraiture, street photography and travel photography.

Short Telephoto.

70mm-135mm. Short telephoto lenses are used for sports photography, portraiture and street photography.

Telephoto or Super Telephoto

135-300mm and higher. Telephoto and super telephoto lenses are used for wildlife photography, sports photography and other situations where you require considerable magnification.

The Nifty Fifty

A very popular lens choice is the 50mm Prime lens. It is nicknamed the Nifty Fifty. The 'nifty' part comes from it's available aperture values (more on this later), and the 'fifty' part from its Focal Length. The nifty fifty lens is the closest you can get to the human eye as the lens is right in the mid-

point of eye's focal range. Like the human eye there's very little distortion or magnification in your image.

Aperture

Another way lenses are characterised is by the aperture settings available in the lens. The aperture determines how much light from the scene is entering the the camera body. A wide aperture lets in more light than a narrow aperture.
The aperture is a variable diameter opening through which light can pass. Photographers use f/numbers or f/stops to describe aperture settings. The range of f/numbers available depends on the lens. Cheaper lenses have a limited range while expensive lenses have more, but typically all lenses will have all or a subset of the set of f/numbers known as the TRUE Aperture numbers and these are

f/1, f/1.4, f2, f2.8, f4, f5.6, f8, f11, f16, f22, f32, f45, f64, f90

All lenses have the maximum, that is widest Aperture settings available to them printed somewhere on the lens. This usually of the form 1:3.5-5.6 for a Zoom Lens and indicates that the lowest f/number that can be set with the Zoom set to wide is f/3.5 and with the Zoom set to telephoto it is f/5.6. This is for a Canon EF-S 18-55mm kit lens. The full specification for this lens would therefore be Canon EF-S 18-55mm 1:3.5-5.6. If the lens is a Prime lens only one number is shown and this is the maximum Aperture available at the lens Focal Length. My nifty fifty is therefore a Canon EF50mm 1:1.8.
Lenses with low f/numbers are often referred to as 'fast lenses' because letting in more light allows faster Shutter Speeds. The Nifty Fifty is referred to as a fast lens because it is available in f1.2, f1.4 and f1.8 versions. In practice not all f/numbers will be available to the camera or photographer in any particular situation as this depends on the intensity of the light in the scene and other factors.

Depth of Field

The aperture setting determines Depth of Field in the image. This is the part of the scene which will be in focus. Anything not within the Depth of Field will be out of focus. The lower the f/number the narrower the Depth of Field. Lenses with low f/numbers are more expensive because they allow greater control over Depth of Field and faster Shutter Speeds. Narrow Depth of Field is excellent in portrait and macro photography.

Lens Mounts

Lens mounts are mechanical and electrical interfaces between a camera and a lens. Most mounts now have a bayonet type connecter. All camera manufacturers have their own mounts with different specifications. When you buy a new lens for your camera you need to make sure the lens mount matches or is compatible with the mount on your camera. Here are some of the more common ones.

Canon

EF. The standard mount for all EOS SLR 35mm film and Full Frame Digital cameras.
EF-S. Used with Canon EOS cameras with APS-C image sensors.
EF-M Used with Canon M Series Mirrorless cameras with APS-C image sensors.
RF, RF-S Used with Canon R Series Full Frame cameras and R series APS-C image sensors.

EF lenses can be used on cameras with EF-S mounts as they are backwards compatible. EF-S lenses cannot be used on EF cameras.
There are adapters available that allow EF and EF-S lenses to be used with EOS M cameras and EOS R cameras.

Nikon

AF. Used with Nikon 35mm film, Full Frame Digital and APS-C cameras
Z. Used with Nikon Mirrorless Full Frame and APS-C cameras.
Nikon use many suffixes with both AF and Z lenses to denote the focussing technology used. In addition they have a further code to designate the image sensor the lens is optimised for.
DX. APS-C image sensor.
FX. Full Frame image sensor.

Sony

E/FE. Used with Sony Alpha Mirrorless Full Frame and NEX Mirrorless APS-C cameras.

Many lenses have additional switches or controls somewhere on the barrel of the lens.

Manual/Auto Focus.

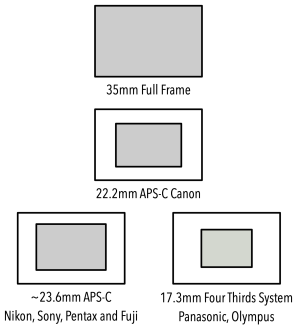
The focus on many lenses can be control automatically by the camera or manually by the photographer. This is selected by a switch. In manual mode focus is controlled by the lens focus ring which is usually at the front of the lens. In some Mirrorless cameras there is no switch, manual or automatic selection is done in the camera menu.

Stabilisation.

Some lenses also have a switch to select Image Stabilisation. This is additional electronics which tries to compensate for accidental movements of the camera when you take a picture. Again some cameras have Stabilisation options in the camera menu.

Camera Sensors. Full Frame and Crop

An image is captured in your camera with the Image Sensor, but not all Sensors are the same size. Typically cameras have a full frame 35mm equivalent sensor or a more compact APS-C sensor.



The graphic on the left shows the difference between a full frame and APS-C sensor. It means your field of view with any lens you attach will be slightly smaller with an APS-C sensor. It is effectively cropped. The graphic on the right illustrates this better in terms of an image, however the lens would adjust magnification to ensure the image fills the sensor active area whatever version of APS-C is in use.
It is important you identify what type of sensor your camera has so that you can get a compatible lens.

Buying a Lens

One of the most flexible and versatile lenses you can buy in the first instance is a good fast general purpose zoom lens. This is true whether your buying a lens for a camera you bought with no lens or replacing the kit lens that came with the camera. Remember a 'fast' lens is one with a wide aperture of around f/1.2 to f/3.5. The rule of thumb is -the faster the better. A wide aperture gives you fast shutter speeds and a shallow depth of field.

I would recommend something like an 18-150mm f3.5 as a very good starting point. Canon do a lens with this specification in their RF and M series lenses, with a 24-105mm f/3.5 in the EF series and an 18-135mm f/3.5 in the EF-S series. Nikon have an 24-120mm f/4 in the Nikkor series but they do faster lenses if you go for a maximum zoom of around 70mm. There are also comparable lenses from Sigma, and Tamron. A lens such as this would become your primary lens for regular day to day use.

You may also consider additional lenses for more specialist photography. A long telephoto lens such as a 55-200mm or 70-300mm is great for wildlife and sports where the subject are at a distance. Again go for the fastest lens your budget can afford.

One or two fast Prime lenses would also be a great addition to your camera kit, especially for portraits and low light. Typically 35mm, the Nifty Fifty 50mm mentioned earlier and 85mm.

Think about what type of photography you want to do and then choose the lens to suit.